

## CLAIMS

1. According to the present invention there is provided a method for the treatment of vulcanized rubber comprising the steps of:

providing a solution of sulfur in a fatty acid or ester or a salt thereof;

5 blending the solution with particulate vulcanized rubber; and

heating the blend for a time period and at a sufficient temperature and pressure to substantially devulcanize the rubber.

2. A method according to claim 1, wherein an oil-base softening agent is added to the blend prior to heating of the blend to soften the rubber during treatment.

10 3. A method according to claim 2, wherein the softening agent is an aromatic oil.

4. A method according to claim 1, wherein, during blending of the vulcanized rubber with the solution, the blend is cooled.

5. A method according to claim 4, wherein the blend is cooled by water cooling a mixing vessel in which the vulcanized rubber and the solution are being blended.

15 6. A method according to claim 1, wherein the blend is heated for a time period of from about 1 hour to about 8 hours.

7. A method according to claim 6, wherein the blend is heated for a time period of from about 4 to about 8 hours.

8. A method according to claim 1, wherein the blend is heated at a temperature of  
20 from about 180°C to about 200°C.

9. A method according to claim 1, wherein the treatment is carried out at a pressure of from about 18 to about 20 kg/cm<sup>2</sup>.

10. A method according to claim 1, wherein the blend comprise about 100 parts particulate rubber, 4 to 6 parts softening agent and 2 to 4 parts treatment solution.

25 11. A method according to claim 1, wherein the particulate rubber is rubber crumb having a particle size of less than 6mm.

12. A method according to claim 1, wherein the particulate rubber is powdered rubber.

13. A method according to claim 1, wherein the solution of sulfur and fatty acid or  
30 ester or salt thereof comprises a solution of sulfur and fatty acid or ester or salt thereof in a ratio of 1:4.

- 10 -

14. A method according to claim 1, wherein the fatty acid or ester or salt thereof is an unsaturated fatty acid or ester or salt thereof.

15. A method according to claim 14, wherein the fatty acid is oleic acid.

16. A method according to claim 1, wherein the treatment solution is prepared by  
5 adding powdered ventilated sulfur to oleic acid which has been heated to approximately to 160°C while stirring the solution and increasing the temperature of the solution until the sulfur is completely dissolved in the oleic acid.

17. A method according to claim 16, wherein the temperature of the solution is increased to about 180°C to dissolve the sulfur in the oleic acid.

10 18. A method according to claim 1, wherein heating of the blend is achieved in an autoclave.

19. A method according to claim 18, wherein said autoclave is a rotating autoclave.

20. A method according to claim 1, wherein said method is carried out as a continuous process comprising a number of treatment stages.

15 21. A method according to claim 1, wherein following heating the blend is cooled or allowed to cool and wherein the cooled blend is then transferred to a milling station where it is milled one or more times, optionally with water cooling.

22. A method according to claim 21, wherein cooled blend is milled at least three times.

20 23. A method according to claim 21, wherein the milled rubber is cooled and then heated up to about 130°C, re-cooled and remilled.

24. A solution for treating vulcanized rubber, the solution comprising:  
a fatty acid or ester or a salt thereof; and  
sulfur.

25 25. A solution according to claim 24, additionally comprising an oil-base softening agent.

26. A solution according to claim 25, wherein the softening agent is an aromatic oil.

27. A solution according to claim 25, comprising about 100 parts particulate rubber,  
4 to 6 parts softening agent and 2 to 4 parts treatment solution.

30 28. A solution according to claim 24, comprising said sulfur and fatty acid or ester or salt thereof in a ratio of 1:4.

- 11 -

29. A solution according to claim 24, wherein the fatty acid or ester or salt thereof is an unsaturated fatty acid or ester or salt thereof.

30. A solution according to claim 29, wherein the fatty acid is oleic acid.